

CLAIMS

1. A method of diagnosing a predisposition to developing metastatic lesions of colorectal cancer in a subject, comprising determining a level of expression of
5 metastasis-associated gene in a patient derived biological sample, wherein an increase in said level compared to a normal control level of said gene indicates that said subject suffers from or is at risk of developing metastatic lesions of colorectal cancer.
2. The method of claim 1, wherein said metastasis-associated gene is selected from the group consisting of MLXs 1-163.
- 10 3. The method of claim 1, wherein said method further comprises determining said level of expression of a plurality of metastasis-associated genes.
4. The method of claim 1, wherein the expression level of metastasis-associated gene is determined by any one method selected from the group consisting of:
15 (a) detecting mRNA of the metastasis-associated gene;
(b) detecting protein encoded by the metastasis-associated gene; and
(c) detecting the biological activity of the protein encoded by the metastasis-associated gene.
5. The method of claim 1, wherein said level of expression is determined by detecting hybridization of metastasis-associated gene probe to a gene transcript of said patient
20 derived biological sample.
6. The method of claim 5, wherein said hybridization step is carried out on a DNA chip.
7. The method of claim 1, wherein said patient derived biological sample is primary colorectal cancer.
8. The method of claim 1, wherein said increase is at least 10% greater than said normal
25 control level.
9. A primary colorectal cancer reference expression profile, comprising a pattern of gene expression of two or more genes selected from the group consisting of MLXs 1-163.
10. A method of screening for a compound for treating colorectal cancer or preventing metastasis of colorectal cancer, said method comprising the steps of:
30 (1) contacting a test compound with a polypeptide selected from the group consisting of:
(a) a polypeptide comprising the amino acid sequence encoded by a polynucleotide selected from the group consisting of MLXs 1-163;
(b) a polypeptide that comprises the amino acid sequence encoded by a
35 polynucleotide selected from the group consisting of MLXs 1-163, in which one or more amino acids are substituted, deleted, inserted, and/or added and that has a biological activity equivalent to a protein consisting of the amino acid sequence

- encoded by the polynucleotide; and
- (c) a polypeptide encoded by a polynucleotide that hybridizes under stringent conditions to a polynucleotide selected from the group consisting of MLXs 1-163, wherein the polypeptide has a biological activity equivalent to a polypeptide consisting of the amino acid sequence encoded by the polynucleotide selected from the group consisting of MLXs 1-163;
- 5 (2) detecting the binding activity between the polypeptide and the test compound; and
- (3) selecting a compound that binds to the polypeptide.
11. A method of screening for a compound for treating colorectal cancer or preventing metastasis of colorectal cancer, said method comprising the steps of:
- 10 (1) contacting a test compound with a polypeptide selected from the group consisting of:
- (a) a polypeptide comprising the amino acid sequence encoded by a polynucleotide selected from the group consisting of MLXs 1-163;
- 15 (b) a polypeptide that comprises the amino acid sequence encoded by a polynucleotide selected from the group consisting of MLXs 1-163, in which one or more amino acids are substituted, deleted, inserted, and/or added and that has a biological activity equivalent to a polypeptide consisting of the amino acid sequence encoded by the polynucleotide; and
- 20 (c) a polypeptide encoded by a polynucleotide that hybridizes under stringent conditions to a polynucleotide selected from the group consisting of MLXs 1-163, wherein the polypeptide has a biological activity equivalent to a polypeptide consisting of the amino acid sequence encoded by the polynucleotide selected from the group consisting of MLXs 1-163;
- 25 (2) detecting the biological activity of the polypeptide of step (a); and
- (3) selecting a compound that suppresses the biological activity of the polypeptide in comparison with the biological activity detected in the absence of the test compound.
12. A method of screening for a compound for treating colorectal cancer or preventing metastasis of colorectal cancer, said method comprising the steps of:
- 30 (1) contacting a test compound with a cell expressing one or more marker genes, wherein the marker genes are selected from the group consisting of MLXs 1-163; and
- (2) selecting a compound that reduces the expression level of one or more of the marker genes.
- 35 13. The method of claim 12, wherein said cell expressing one or more marker genes comprises a colorectal cancer cell.

14. A method of screening for a compound for treating colorectal cancer or preventing metastasis of colorectal cancer, said method comprising the steps of:
- (1) constructing a vector comprising the transcriptional regulatory region of a gene selected from the group consisting of MLXs 1-163 upstream of a reporter gene;
 - 5 (2) transforming a cell with the vector of step (1);
 - (3) contacting a test compound with the cell of step (2);
 - (4) detecting the expression of the reporter gene; and
 - (5) selecting the test compound that suppresses the expression of the reporter gene compared to that in the absence of the test compound.
- 10 15. A kit comprising one or more detection reagents that respectively binds to one or more nucleic acid sequences selected from the group consisting of MLXs 1-163.
16. An array comprising one or more nucleic acids that respectively binds to one or more nucleic acid sequences selected from the group consisting of MLXs 1-163.
17. A method for treating colorectal cancer or preventing metastasis of colorectal cancer, said method comprising the step of administering a pharmaceutically effective amount of a compound that is obtained by the method according to any one of claims 10-14.
- 15 18. A method for treating colorectal cancer or preventing metastasis of colorectal cancer in a subject, said method comprising the step of administering to the subject a pharmaceutically effective amount of an antisense nucleic acids or small interference
- 20 RNA against one or more genes selected from the group consisting of MLXs 1-163.
19. A method for treating colorectal cancer or preventing metastasis of colorectal cancer in a subject, said method comprising the step of administering to the subject a pharmaceutically effective amount of an antibody or fragment thereof that binds to a protein encoded by a gene selected from the group consisting of MLXs 1-163.
- 25 20. A method for treating colorectal cancer or preventing metastasis of colorectal cancer in a subject, said method comprising the step of administering to the subject a pharmaceutically effective amount of a polypeptide selected from the group consisting of (a)-(c), or a polynucleotide encoding the polypeptide or a vector comprising the polynucleotide:
- 30 (a) a polypeptide comprising the amino acid sequence encoded by a polynucleotide selected from the group consisting of MLXs 1-163 or fragment thereof;
 - (b) a polypeptide that comprises the amino acid sequence encoded by a polynucleotide selected from the group consisting of MLXs 1-163, in which one or more amino acids are substituted, deleted, inserted, and/or added and that has a
 - 35 biological activity equivalent to a protein consisting of the amino acid sequence encoded by the polynucleotide or fragment thereof; and

- (c) a polypeptide encoded by a polynucleotide that hybridizes under stringent conditions to a polynucleotide selected from the group consisting of MLXs 1-163, wherein the polypeptide has a biological activity equivalent to a polypeptide consisting of the amino acid sequence encoded by the polynucleotide selected from the group consisting of MLXs 1-163 or fragment thereof.
- 5 21. A method for inducing an anti-tumor immunity, said method comprising the step of contacting with an antigen presenting cell a polypeptide selected from the group consisting of (a)-(c), or a polynucleotide encoding the polypeptide or a vector comprising the polynucleotide:
- 10 (a) a polypeptide comprising the amino acid sequence encoded by a polynucleotide selected from the group consisting of MLXs 1-163 or fragment thereof;
- (b) a polypeptide that comprises the amino acid sequence encoded by a polynucleotide selected from the group consisting of MLXs 1-163, in which one or more amino acids are substituted, deleted, inserted, and/or added and that has a biological activity equivalent to a protein consisting of the amino acid sequence encoded by the polynucleotide or fragment thereof; and
- 15 (c) a polypeptide encoded by a polynucleotide that hybridizes under stringent conditions to a polynucleotide selected from the group consisting of MLXs 1-163, wherein the polypeptide has a biological activity equivalent to a polypeptide consisting of the amino acid sequence encoded by the polynucleotide selected from the group consisting of MLXs 1-163 or fragment thereof.
- 20 22. The method for inducing an anti-tumor immunity of claim 21, wherein the method further comprises the step of administering the antigen presenting cell to a subject.
23. A composition for treating colorectal cancer or preventing metastasis of colorectal cancer in a subject, said composition comprising a pharmaceutically effective amount of a compound that is obtained by the method according to any one of claims 10-14.
- 25 24. A composition for treating colorectal cancer or preventing metastasis of colorectal cancer in a subject, said composition comprising a pharmaceutically effective amount of an antisense nucleic acids or small interference RNA against one or more genes selected from the group consisting of MLXs 1-163.
- 30 25. A composition for treating colorectal cancer or preventing metastasis of colorectal cancer in a subject, said composition comprising a pharmaceutically effective amount of an antibody or fragment thereof that binds to a protein encoded by a gene selected from the group consisting of MLXs 1-163.
- 35 26. A composition for treating colorectal cancer or preventing metastasis of colorectal cancer in a subject, said composition comprising a pharmaceutically effective amount of

a polypeptide selected from the group consisting of (a)-(c), or a polynucleotide encoding the polypeptide or a vector comprising the polynucleotide:

- (a) a polypeptide comprising the amino acid sequence encoded by a polynucleotide selected from the group consisting of MLXs 1-163 or fragment thereof;
- 5 (b) a polypeptide that comprises the amino acid sequence encoded by a polynucleotide selected from the group consisting of MLXs 1-163, in which one or more amino acids are substituted, deleted, inserted, and/or added and that has a biological activity equivalent to a protein consisting of the amino acid sequence encoded by the polynucleotide or fragment thereof; and
- 10 (c) a polypeptide encoded by a polynucleotide that hybridizes under stringent conditions to a polynucleotide selected from the group consisting of MLXs 1-163, wherein the polypeptide has a biological activity equivalent to a polypeptide consisting of the amino acid sequence encoded by the polynucleotide selected from the group consisting of MLXs 1-163 or fragment thereof.